

## Claims

## What is claimed is:

1 1. A near full duplex portable handset speakerphone comprising:  
2 a. a microprocessor;  
3 b. a hands-free receive register connected to the microprocessor;  
4 c. a hands-free transmit register connected to the microprocessor;  
5 d. a ROM having a speakerphone operation algorithm, the ROM connected to the  
6 microprocessor;  
7 e. a first analog-to-digital converter connected to the hands-free receive register;  
8 f. a second analog-to-digital converter connected to the hands-free transmit register;  
9 g. a first programmable digital attenuator connected to the microprocessor and to a  
10 speaker; and  
11 h. a second programmable digital attenuator connected to the microprocessor and to a  
12 microphone,  
13 wherein near full duplex communication is achieved without digital signal processing.

1 2. A speakerphone system including:  
2 a. a near full duplex portable handset comprising:  
3 i. an integrated circuit controller chip comprising a microprocessor, an embedded  
4 hands-free receive register connected to the microprocessor, an embedded  
5 hands-free transmit register connected to the microprocessor, a pre-amplifier  
6 connected to the microprocessor; and a codec having first and second  
7 programmable digital attenuators, the first programmable digital attenuator  
8 connected to the microprocessor, and the second programmable digital  
9 attenuator connected to the microprocessor, to the embedded hands-free  
10 transmit register, and to the pre-amplifier,  
11 wherein near full duplex communication is achieved without digital signal processing.

1 3. The speakerphone system of claim 2, wherein the portable handset further comprises:  
2 a. a ROM having a speakerphone algorithm, the ROM connected to the microprocessor;  
3 b. a first programmable digital attenuator connected to the first programmable digital  
4 attenuator;  
5 c. a speaker connected to the first programmable digital attenuator;  
6 d. a microphone connected to a second programmable digital attenuator;  
7 e. the second programmable digital attenuator connected to the pre-amplifier; and

8        f.        a radio frequency interface connected to the first and second programmable digital  
9                    attenuators.

1        4.        The speakerphone system of claim 2, further including a base station comprising:  
2        a.        an integrated circuit controller chip comprising a codec;  
3        b.        a telephone line interface; and  
4        c.        a radio frequency interface.

1        5.        The speakerphone system of claim 3, further including a base station comprising:  
2        a.        an integrated circuit controller chip comprising a codec;  
3        b.        a telephone line interface; and  
4        c.        a radio frequency interface.

1        6.        A near full duplex speakerphone system comprising:

2        a.        a portable handset comprising:  
3            i.        an integrated circuit controller chip comprising a microprocessor, an embedded  
4                    hands-free receive register connected to the microprocessor, an embedded  
5                    hands-free transmit register connected to the microprocessor, a pre-amplifier  
6                    connected to the microprocessor; and a codec having first and second  
7                    programmable digital attenuators, the first programmable digital attenuator  
8                    connected to the microprocessor, and the second programmable digital  
9                    attenuator connected to the microprocessor, to the embedded hands-free  
10                  transmit register, and to the pre-amplifier;  
11            ii.        a ROM having a speakerphone algorithm, the ROM connected to the  
12                  microprocessor;  
13            iii.        a first programmable digital attenuator connected to the first programmable  
14                  digital attenuator;  
15            iv.        a speaker connected to the first programmable digital attenuator;  
16            v.        a microphone connected to a second programmable digital attenuator;  
17            vi.        the second programmable digital attenuator connected to the pre-amplifier;  
18            vii.        a radio frequency interface connected to the first and second programmable  
19                  digital attenuators; and  
20        b.        a base station comprising:  
21            i.        an integrated circuit controller chip comprising a codec;  
22            ii.        a telephone line interface; and  
23            iii.        a radio frequency interface,

24        wherein near full duplex communication is achieved without digital signal processing.

1 7. A method of operating a ~~hands-free~~ duplex speakerphone by a microprocessor in a portable  
2 handset, without digital signal processing, the handset further including a ROM containing  
3 a stored operation algorithm for directing the microprocessor, hands-free transmit and receive  
4 registers, a microphone, a speaker, a first speech path between the microphone and a radio  
5 frequency interface, and a second speech path between the speaker and the radio frequency  
6 interface, the method comprising the steps of:  
7 a. directing the reading of the hands-free registers, and determining the peak volume  
8 levels of both speech paths; and  
9 b. digitally adjusting the microphone and speaker gains in relation to the peak volume  
10 levels.

1 8. The method of claim 7, wherein the stored operation algorithm uses software timers and peak  
2 detection.

1 9. The method of claim 8, wherein a software timer generates a hardware interrupt to the  
2 microprocessor on every speech frame so that one of the hands-free registers can be read by  
3 a software peak detector.

*add a1*

*add*

*C2*